Better Practice Guidelines (BPGs) for marine pen and cage farmers for responsible and sustainable production

Output from PHILMINAQ

Project number: FP6-2004-INCO-DEV-SSA- 031640 6th Framework Programme

Duration: 08/2006 to 02/2008 (18 months) Specific Support Action

PHILMINAQ Project Partners

- Akvaplan-niva AS
- Bureau of Fisheries and Aquatic Resources
- Scottish Association of Marine Science
- Marine Science Institute, Univ. of the Philippines

Codes of Conduct

Codes of Conduct comprise a set of general rules and principles which should lead to the responsible and sustained development of the industry. Therefore in some cases these Codes include practical guidelines for the cultivation of aquatic organisms. In other cases they do not, and instead they are supplemented by Codes of Good and Best Practice.

Codes of Practice take into consideration the best available methods, techniques, strains, optimal feeding regimes, environmental sustainability, welfare of the animals and other issues related to aquaculture. A Code of Practice should provide a practical guide to help operators avoid causing pollution and give recommendations on practices that optimise the environmental management of the operations. In addition, economic considerations regarding the future growth and development of the sector are also included. Such Code of Best Practices (CBPs) are practical and applied guidelines, which are more specific in nature than general Codes of Conduct, and are recommended practices at farm level to ensure a responsible development of the industry (Holmes 2001).

The development of CBPs could be achieved through the education of farmers based on the latest scientific findings. The rapid technical development implies the need for continuously sharing data and practical and theoretical information between the various stakeholders.

Codes of Practice for Aquaculture in the Philippines (FAO 214)

This Code of Practice outlines principles and guidelines for environmentally-sound design and operation for sustainable development of aquaculture industry. It lists down general guidelines for site selection and evaluation, farm design and construction, water usage, water discharge, effluent management, use of drugs, chemicals, potential toxic fertilizers and pesticides, stock selection, introduction of exotic species and GMOs, feed management, fish health management, aquaculture data management and incentive schemes to encourage compliance.

Codes of practice that are relevant to the better practice guidelines prepared here are included in blue.

Better Aquaculture Practice Guidelines in the Philippines

The Philippine Department of Agriculture Bureau of Agriculture and Fisheries Product Standards is developing a Best Aquaculture Practice Program that leads to certification of farms.

The objectives of the certification scheme is to assist the Department of Agriculture to:

- ensure safe and quality aquaculture products;
- facilitate fish farmers'/aquaculturists' adoption of responsible, ecologically and economically sustainable aquaculture practices;
- uplift BAP farmers' profiles as members of the nationally recognized list of fish farmers/aquaculturists that is setting the benchmark for the aquaculture production of safe and quality fishery products;
- enable consumers to exercise the option of buying quality aquaculture products from traceable and certified sources; and
- increase the market access of safe and quality aquaculture products both in the local and foreign markets.

The better practice guidelines developed by the PHILMINAQ project include many of the relevant DA-BAFPS Better Aquaculture Practice Guidelines which are included in red.

Better Practice Guidelines (BPGs)

Better-Practice Guidelines aim to give farmers sensible and practical guidelines to follow in the planning, management and operation of their farms. These guidelines are based on lessons learned from local and international practice or scientific research. Better Practice Guidelines are useful to improve our ways of working (knowledge, skills, capacity and practices).

We no not yet know the best way to produce fish but we can improve the way we do it based on lessons learned, knowledge and research. By describing and sharing this, we hope to provide guidelines toward “better-practice”.

These guidelines are being developed as good practice guidelines that if followed, would encourage responsible and sustainable production. They incorporate many of the DA-BAFPS BAPS but are focussed on particular culture systems and mitigating aquaculture impact on the environment.

It is hoped that these guidelines will be taken up by producer organisations, mariculture parks, aquaculture parks, clusters of farmers and large farmers. It would be difficult for a farmer to implement all guidelines immediately but it is hoped that the farmers will start to implement some immediately and gradually implement the others as time goes by.

Different Better Practice Guidelines (BPGs) should be developed depending on species, culture system and geographical location.

BPGs at culture system level

Different BPGs should be developed depending on species, culture system and geographical location.

It is recommended that for the Philippines the following BPGs are developed.

- Hatchery and nursery
- Cage and pen culture
- Pond culture
- Mollusc culture
- Seaweed culture
- Post harvest

This report attempts to prepare BPGS for cage and pen operators with emphasis on mitigating environmental impact. These BPGs cover both cages and pens in marine, brackish and freshwaters. The guidelines cover the culture practice from the purchase of fry or fingerlings until the point of sale.

Better practice guidelines at the farm level

This BMG is separated in to sections which follow the culture process as follows;

1. Planning and siting
2. Farm design and construction
3. Broodstock and hatchery management
4. Production management
   - Feed and feed management
   - Fish health and welfare
   - Quality and food safety
5. Harvest and post harvest management
6. Monitoring and evaluation
7. Record keeping
8. Socio aspects (staff training, health and safety)
9. Environmental mitigation

Crosscutting issues

Within each section there are crosscutting issues that need to be addressed

- Legal and regulatory
- Genetics and biodiversity
- Biosecurity
- Sustainable operation
- Environment

1. Planning and siting BPGs

It is clear from substantial worldwide experience that inappropriate and unplanned siting of farms has resulted in production failures, environmental degradation, land use conflicts and social injustice. Thus, it is imperative that, during establishment of farms, due consideration is given to the environment, ecologically sensitive habitats, other land use in the vicinity, and the sustainability of the shrimp farming operations themselves.

Locate farms according to national planning and legal frameworks in environmentally suitable locations, making efficient use of land and water resources and in ways that conserve biodiversity, ecologically sensitive habitats and ecosystem functions, recognizing other land uses, and that other people and species depend upon these same ecosystems.

Correct and appropriate planning and siting is essential for a sustainable and economically successful production.

These planning and siting BPGs relate to seabased cages and pens.

Principles

- Environmentally suitable areas
- Water supply sufficient and suitable for aquaculture Water with adequate current flow for flushing of organic matter (Water supply normally refers to pond culture water source)
- Minimise impact to sensitive habitats

- Long-term sustainability
- Avoid conflicts with other coastal users
- Avoid navigational routes
- Avoid sites with fluctuating water quality
- Integrated with local community

Legal

As a general requirement, farms shall comply with local and national laws and environmental regulations and provide current documentation that demonstrates equal rights for land use, water use, construction and operation and farms shall not deny local communities access to public mangrove areas, fishing grounds and public resources.

Potential sites for aquaculture shall be thoroughly evaluated in accordance with DA BFAR Fisheries Administrative Order No. 214, s.2001: Code of Practice for Aquaculture, Sec.2.

Potential sites for aquaculture shall be thoroughly evaluated by BFAR in consultation with DENR, LGUs, and NFARMC to ensure that ecological and social conditions are sustained and protected.

The following practices shall ensure that the sites selected are appropriate for aquaculture farms:

1.1. Obey land use and other planning laws and coastal management plans.
1.2. Farms should conform with licensing and permitting requirements
1.3. Navigation channels and routes should be avoided
1.4. Fish spawning and nursery areas as well as established fishing zones should be avoided
1.5. Installations should be within the defined zones for pens and cages.

Sustainability

1.6. Farms should be sited in good location and with sufficient clean water
    - Water depth ideally between 15 and 30 m
    - Water current – average should be between 5 and 20cm/s but max speed should not be over 100 cm/s
    - Wave height not more than 2 meters

1.2. Water should be of good quality (high or adequate dissolved oxygen, stable pH, and low turbidity, and absence of pollution.
1.3. Farms should be located in areas away from sources of domestic, industrial and agricultural pollution or risks (rivers, flooding, storm waves, biofouling)
1.4. Sites should be located close to infrastructure (Jetties, waste disposal), services (training, extension) and markets (livefish, cold chain)
1.5. Bottom mud should be firm to allow pen framework to be driven 500 mm deep into substrate for better support.

Environmental

1.7. Farms should be sited in harmony with the ecosystem (away from sensitive habitats) and surroundings and not conflict with other users of the coastal area
1.8. Do not locate new farms in areas that have already reached carrying capacity for

aquaculture.

1.9. Retain buffer zones and habitat corridors between farms and other users and habitats.

The following other factors should be considered:

- Accessibility to market;
- Availability of fast and good transport facilities for marketing of aquaculture products;
- Availability of seeds for stocking/farming;
- Availability of manpower;
- Availability of ice and cold storage facilities;
- Availability of supplementary feeds, fertilizers and other required inputs;
- Availability of construction materials;
- Access to credit; and
- Peace and order condition in the locality.

Other

- Restriction of currents due to excessive number of nets
- Distances between farms
- Area allocated for expansion

2. Farm design and construction BPGs

With the increasing intensity and expansion of fish farming operations evident in recent years, suitable design and construction techniques should be used when establishing new farms. Advantage should be taken of improved techniques that take into account not only the requirements of the cultured fish and the management of the farm, but also integrate the farm into the local environment whilst causing the minimum possible disturbance to the surrounding ecosystems.

Design and construct farms in ways that minimize environmental damage.

These farm design BPGs are guidelines that should be followed during the design and construction stages.

Principles

- Design appropriate to location and environment
- Design with biosecurity in mind
- Use appropriate materials
- Consider the health and safety aspects of workers
- Use integrated aquaculture where possible (fish, mollusc and seaweed)
- Flexible and low risk technology
- Design for ease of operation and management

Legal

Proven and accepted designs and construction procedures shall be adopted to overcome problems related to floods levels, storms, erosion, seepage, water intake and discharge points

and encroachment on mangroves and wetland as well as social impacts (DA-BFAR 556 Fisheries Administrative Order No. 214, s.2001, Sec.3).

An EIS shall be required to be submitted to the DENR for review and evaluation before initiating any development activity or construction.

Design features

1.1. The pens and cages should be sized properly for the cultured species and positioned accordingly (water dynamics) to prevent waste accumulation.
1.2. Use barrier nets to prevent escapes (escapes can later the biodiversity of wild fish in the vicinity)
1.3. Use appropriate cage size for fish species and appropriate net size for fish size
1.4. Design moorings to be recovered
1.5. Do not use nets deeper than 1/3 of water depth
1.6. Space cages apart from each other to allow water exchange

Materials

1.7. The construction materials should be strong (not destroyed by storms), harmless (non corrosive, biodegradable), easily maintained, long lasting, available locally.
1.8. Avoid using corrosive materials for cages

Sustainability

1.9. Fish cages, floating or stationary, should be installed and kept at least one (1) meter between units with a maximum of 10 in a cluster and at 20 meters between clusters to provide water exchange.
1.10. Fish pens should be spaced 200 meters apart.
1.11. The construction should not damage aquatic life and habitat.
1.12. Site improvement, grow out equipment and structures should be capable of withstanding adverse weather conditions.
1.13. All construction should be completed with a minimal disturbance to the aquatic environment. Construction waste and other deleterious substances should be disposed of properly.

Other

- Design for ease of operation and management
- Restriction of currents due to excessive number of nets
- Distances between farms

3. Fry and Fingerling purchase or collection

The stocking of good quality of fry is an important factor in the success of the farm.

Stocking of hatchery reared fry BPGs

Principles

Hatchery fry and fingerlings should be encouraged for use rather than those caught from the wild.

Legal
Practices embodied under Sec. 7 of the DA-BFAR FAO No. 214, shall be practiced to assure increased production of good quality and disease-free stocks promoting profitable fish farming.

Genetics and biodiversity
3.1 Use domesticated stocks wherever possible
3.2 Give preference to local and indigenous species

Biosecurity
3.3 Adopt on-farm quarantine and biosecurity measures to reduce risks of disease introductions
3.4 Comply with national, regional and international criteria controlling the movement and quarantine of fish

Operation
3.5 Stock only healthy fry and fingerlings/seedlings. Genetically improved fish species for stocking should be sourced from government and accredited non-government hatcheries.
3.6 Grow fry to appropriate fingerling size for stocking in pens and cages
3.7 Acclimatise fingerlings before stocking in cages and pens
3.8 Moderate and appropriate stocking density by species should be employed
3.9 Grade regularly to prevent cannibalism
3.10 Grade prior to stocking in cages and pens
3.11 Transport time between hatchery and grow-out site should be less than 3 hours (otherwise use oxygen)

Stocking of wild fry BPGs

Genetics, biodiversity and environment
3.12 Avoid collecting wild fry which can cause negative impacts on local biodiversity
3.13 Limit the harvesting of wild-caught fry, fingerlings and juveniles.
3.14 Seedstock should not be collected from protected or environmentally sensitive areas.
3.15 Seesdstock should be collected using gears that reduce bycatch.
3.16 Avoid using very fine mesh collection nets
3.17 Release live bycatch back into the wild

Biosecurrity
3.18 Disinfect freshly caught fry
3.19 Disinfect fingerlings before stocking in cages and pens

Operation
3.20 Grow wild caught fry to appropriate fingerling size before stocking in cages and pens
3.21 Wean wild fry from live to dry feed

3.22 Acclimatise fingerlings before stocking in cages and pens

4 Production management BPGs

Good production management practice will ensure efficient production, avoid disease outbreaks and prevent feed wastage all leading to profitable production.

Operation and husbandry

Genetics

4.1 Prevent gamete loss as far as possible (harvest before spawning time)
4.2 Prevent escapes from hatchery, nursery and cages

Operation

4.3 Use correct mesh size for fish size
4.4 Inspect nets regularly and repair to prevent escapes
4.5 Clean or change nets regularly to prevent biofouling (cages)
- Mesh size 8mm – weekly
- Mesh size 25mm – 2 to 4 weeks
- Mesh size 38mm - 4 to 6 weeks

4.6 Dispose of net wash water correctly (Net is usually washed in open water)
4.7 Check moorings regularly (especially after storms)
4.8 Only use approved antifouling agents
4.9 No not overstock cages
4.10 Avoid killing predators – use scaring systems
4.11 Make life saving equipment available on the cages
4.12 Collect human waste while at sea – dispose correctly

Feed and feed management

Control and rationalization of feeds and feeding in modern fish farming is of critical importance in maintaining a cost-effective and environmentally sound industry.

This is due to many factors including:

- Feeds and feeding account for 50-60% of the operational costs of semi and intensive shrimp farming.
- Wasted (uneaten and unmetabolized) feed in addition to affecting water quality and predisposing fish to disease is also a major contributor to the discharge of nutrients and organic matter from fish farms leading to eutrophication of the environment.
- Increasing concern is also being expressed regarding the wasteful use of increasingly scarce resources of fishmeal going into fish and shrimp diets for a net loss of protein resources and allied losses due to by-catch from the fishmeal industry.
- Formulation of cost-efficient and high quality, low polluting diets, and proper management of the feeding regime are thus crucial in attempting to optimize the efficient use of feeds in fish farming.

Efficient feeding practices will improve feed conversion efficiency (reduce FCR) and economic returns

Principles

Utilize feeds and feed management practices that make efficient use of available feed resources, promote efficient shrimp growth, minimize production and discharge of wastes.

- Use good quality formulated feeds.
- Make efficient use of fish feed resources. Do not overfeed, Do not feed when there is low oxygen.
- Minimize feed wastage.
- Feeds must meet the nutritional requirements of the fish

Legal

Practices embodied under Sec. 9 of the DA-BFAR FAO No. 214, shall be adopted to improve the efficiency of supplemental feeds and feed management in aquaculture and reduce the amount of waste entering the ponds.

DA Administrative Order No. 16 on the "Nutrient Standard for Aquaculture Feeds" and other regulations of the Bureau of Animal Industry shall be complied with.

Trash fish

4.13 Avoid using trash fish

4.14 Ensure that where 'trash' fish is used, it is sourced from sustainable stocks

Inert feeds – feed quality

4.15 Feeds should be selected as to their high digestibility rates and include binders to reduce nutrient pollution from uneaten feeds and excretory products. Use extruded dies if possible.

4.16 Feed characteristics should include balance levels of amino acids and other nutrients appropriate for the age of the fish, high palatability to stimulate rapid consumption, and high stability to prevent rapid nutrient release.

4.17 Ideally, extruded feeds should be used.

4.18 Feed correct formulation for species

Inert feeds- feeding strategy

4.19 Feed correct quantities. Follow feeding tables, adjust feed quantity daily

4.20 Good feeding practices should include frequent feeding in small quantities of feed several times through the day, using feeding trays and even distribution of feeds in the cage and pen.

4.21 Do not over feed as this releases additional nutrients into the environment and wastes money

4.22 Avoid feeding when water temperatures are highest (or lowest). Most species feed at temp ranging from 24deg C to 32 deg C. Feeding during cold temp also result in unconsumed feed) and oxygen levels are lowest.

4.23 Use feed-back feed monitoring systems to ensure that there is no feed wastage

4.24 Feed at appropriate number of times according to size of stock;

4.25 Feed correct size for the size of fish
4.26 Ensure that feed is distributed evenly to all fish
4.27 Records of daily feed application rates should be kept to assess feed conversion ratio (FCR) and assess feed performance regularly.

Inert feeds – feeding management – lakes

4.28 Feeding management in lake –based aquaculture should be in conformity with the carrying capacity of the lake as specified under Chapter B, Sec. 13 of the DA BFAR FAO No. 214, to control stocking density and feeding requirements, as follows:

a. the carrying capacity of a lake shall be determined through the conduct of physico-chemical and biological study to determine plankton/algae density, nutrients, transparency and fish biomass and composition.
b. The carrying capacity of fish pens, cages in the lake shall be based on the physico-chemical and biological productivity measured in terms of biomass (g/m^3) and nutrient uptake ($g/C/m^3$); and
c. The level of primary productivity in inland water that could support the good growth of planktivorous species like tilapia, carp, and milkfish shall not be less than 9 gC/m^3 or 33,000 cells per ml.

Inert feeds – storage and use

4.29 Feeds should be stored in cool dry areas to prevent mold and other contaminants from forming.
4.30 Use oldest feed first. “First in, first out” policy in feed handling
4.31 Store feed to prevent contamination
- Ventilated place
- out of the sun
- off the ground
- in a dry place.

4.32 Ensure that feed is fed within the recommended shelf life period.

Inert feeds – Medicated feeds

4.33 Use only regulated medicated feeds
4.34 Medicated feeds should be used only if and when necessary for the control of specific diseases for which the medication is thought to be effective.

5 Fish health BPGs

Good aquatic animal health practices are necessary for the success of any aquaculture production facility. Animals are naturally healthy. A sound management and sanitation program will greatly minimize pathogens and disease in your facility. Knowing the health status of aquatic animals, followed by early diagnosis or prevention of disease is critical to successful production. Disease prevention is based on good animal husbandry practices, including the reduction of animal stress, minimization of pathogens in the culture environment, and quarantine of unhealthy animals.

Legal

Practices embodied under Sec. 6 of the DA-BFAR FAO No. 214, shall be practiced to foster awareness on the proper use of therapeutic agents and other chemicals without endangering food safety or threaten the environment.

Fish farmers shall participate in the BFAR's national program on disease information, surveillance and reporting system.

On-site disease monitoring shall be conducted only by a competent Aquatic Animal Health Officer.

Banned chemicals shall not be used for any purpose.

Drugs, antibiotics and other chemical treatments shall be in accordance with recommended practices and comply with the national and international regulations.

Biosecurity

5.1 Farms should be encouraged to make appropriate provisions for biosecurity:
5.2 Maintain biosecurity and minimise disease transmission between broodstock, hatchery and growout systems
5.3 Screening health status of fish and hold them in quarantine before stocking;
5.4 Provide rearing conditions conducive to healthy fish stock (water quality, stocking density etc.);
5.5 Sample fish regularly to check for disease throughout grow-out.
5.6 Use of footbaths and clean hands at entry points to farm facilities;
5.7 Use clean and disinfected equipment for handling fish (nets, buckets, tanks, trucks etc);
5.8 Always ensure that hygienic condition are maintained at the farming facilities
5.9 Dead, diseased fish should be disposed of in a sanitary manner to prevent the spread of the disease.
5.10 When disease occurs, transfer of fish and equipment between cages, pens or farms should be avoided.

Prevention

Health management at hatcheries and farms should focus on disease prevention through good nutrition, sound management, and overall stress reduction rather than disease treatment.

5.11 Implement management strategies that avoid spreading aquatic animal diseases within and between farms
5.12 Check disease status of the fish regularly
5.13 Be proactive with disease prevention (vaccines, immuno-stimulants, etc.)
5.14 Vaccinate using certified vaccines
5.15 Clean and change nets regularly to prevent bio-fouling (especially between batches of fish);
5.16 Dry and/or lime of earthen nursery ponds between uses;
5.17 Dead fish should be collected and disposed in a hygienic manner (burial, silage, or other).

Treatments

5.18 For non-infectious diseases related to pond condition, specific corrective management measures should be carried out.

5.19 For mild infectious diseases with potential to spread within a farm, the pond should be quarantined and remedial measures should be applied.

5.20 For serious infectious diseases that may spread widely, the pond should be isolated and the remaining fish should be harvested by net and the pond should be disinfected without discharging the water.

5.21 Drug or chemical treatments should be done only when necessary.

5.22 Ensure rational and responsible use of veterinary drugs and minimizing the use of antibiotics

5.23 Banned chemical substances should not be used

5.24 Therapeutants to be used when needed and as prescribed by competent authority:

5.25 Encourage prophylactic treatments (freshwater, hydrogen peroxide, formalin);

5.26 Discourage use of prophylactic use of antibiotics

5.27 Treat disease affected land-based waters prior to discharge (lime to increase water pH >11)

Medications

5.28 Keep records of the medication purchase, use, and disposal

5.29 Buy products from established suppliers

5.30 Use only Government-approved products

5.31 Follow manufacturer's instructions (dose rate and frequency)

5.32 Observe medication withdrawal time before harvesting

5.33 Neutralize unused or residues of chemicals

5.34 Dispose of unused chemicals correctly

Chemical use

5.35 Drugs, chemicals, pesticides including lime should be used only when clearly justified to treat specific problems.

5.36 Only approved chemicals should be used and only for the use approved. Banned chemicals should not be used for any purpose.

5.37 Aquaculture producers should follow the information on product labels regarding dosage, withdrawal period, proper use, storage, disposal and other uses of the chemicals to safeguard environmental and human safety

5.38 Records should be maintained regarding the use of chemicals in ponds as suggested by the Hazard Analysis and Critical Control Points (HACCP) method.

5.39 Records of purchase, application and disposal (log records, procedures, or instruction manual) of drugs, chemicals, pesticides and fertilizers should be kept and produced during farm audit.

5.40 Use non-foaming and biodegradable detergents

5.41 Use only government-approved antifouling paints on nets and boats

5.42 Dispose of unused compounds by methods that prevent environmental contamination.

5.43 Treatment with chemicals, therapeutants or probiotics must be in line with national regulations, including withdrawal periods where appropriate.

Chemical storage

5.44 Therapeutants should be stored in a cool place and in a secure manner and unused compounds should be disposed of by methods preventing environmental contamination.

5.45 Storage area should be isolated from packing to prevent contamination from leaching, run off or wind drift. Good drugs, chemicals, pesticides and fertilizers storage practice should be adhered to, including ensuring that the store has facilities to clean up spills and putting out flames.

5.46 Warning sign should be displayed at the storage area.

Fish Welfare BPGs

Successful aquatic animal husbandry demands that animals be held in healthy environments and fed a healthy diet. Farmed fish must be raised under optimal conditions using humane practices. Aquatic animals for slaughter should be quickly prepared for rapid processing. Aquatic animals reared for stocking in public waters should be transported under good environmental conditions if the fish are to survive.

Transport

5.47 All possible precautionary measures should be taken to minimise stress of the stock during transportation (for example minimise stocking density, provide suitable aeration and water quality, use of anaesthetics during handling of live broodfish and fry transport).

Husbandry and handling

5.48 All possible precautionary measures should be taken to minimise stress of the stock during the culture period (for example minimise stocking density, provide sufficient feed).

5.49 All possible precautionary measures should be taken to minimise stress of the stock during handling and grading at any stage of production (for example provide suitable aeration and water quality, use of anaesthetics during handling).

Harvesting and killing

5.50 Fish should be killed humanely

5.51 Disposal of unproductive broodstock should be in line with Animal Welfare guidelines.

6 Fish quality and food safety BPGs

Legal

6.1 Never use banned chemicals & drugs according to international & national standards

6.2 Obtain the updated list of approved and banned chemicals & drugs regularly from local authority

6.3 Obtain the updated standards on antibiotic withdrawal periods

Operation

6.4 Encourage appropriate antibiotic usage and dosage

6.5 Encourage antibiotic rolling
6.6 Follow the recommendation of the withdrawal periods for allowable drugs
6.7 Ensure quality control of the produces
6.8 Produce should be sent for analysis for hazardous substances, harmful algae, fish borne disease if a warning has been issued by the authority

Record keeping

6.9 Encourage adoption of traceability & record keeping following available international & national formats
6.10 All farming inputs data should be recorded for each production cycle
6.11 Records should be kept for at least two years

7 Harvest and post harvest management BPGs

Harvesting

7.1 Care, cleanliness and cooling practices shall be observed during harvest to have good quality of products and to prevent fish and other fishery species from spoilage.
7.2 Harvesting should be carried out quickly and efficiently, to minimize damage or contamination.
7.3 Availability of adequate storage facilities and/or immediate transport should be ensured before harvesting is started.
7.4 Ice this fish as soon after harvest as possible
7.5 Try to maintain the cold chain from harvest to market
7.6 Appropriate gear, method and proper harvesting operation should be used. Methods destructive to the produce shall not be employed in gathering the same. Watercrafts to be used in gathering/harvesting should be cleaned to prevent contamination from diesel, lubricants, gas or oil and pathogenic organisms.
7.7 Prompt and proper care in handling should be done, since unnecessary damage can provide access for the spoilage bacteria through cuts and wounds, thus hastening their effect on the flesh.
7.8 Cleanliness should be observed throughout the harvested aquaculture product handling chain. All surfaces with which the harvested aquaculture products may come into contact should be scrubbed clean and kept as free as possible from bacteria-laden materials. Harvested aquaculture products shall be handled in hygienic manner so that chances of contamination are kept to a minimum.
7.9 Harvested aquaculture products should be washed/thoroughly brushed, scrubbed and washed in clean water to remove sediment, mud and debris or any foreign materials and other tenacious dirt that may adhere to the produce.
7.10 Personnel with cuts, open wounds or suffering from communicable disease should not be allowed to handle the harvested aquaculture products.
7.11 Aquaculture products under the red tide alert should not be harvested for market.

Pre-chilling

7.12 Low temperature shall be maintained for the harvested aquaculture products as well as the use of salt-water ice, fresh water ice, bactericidal ice, and refrigerated seawater or

through mechanical refrigeration, and shall not be exposed to direct sunlight or to drying effects of winds.

7.13 Pre-chilling shall be done by placing the fish in 1:1 ice and fish ratio to cool it immediately to the temperature of melting ice (0ºC), and/or with use of a chilling tank.

Packaging

7.14 Fish shall be packed in suitable containers with sufficient ice. For long distance transport, and wherever possible it is important to pack fish with using 1:1 ice to fish ratio. Best method of packing of fish shall be observed using layer of ice in the bottom of the container and in between the layers of the fish.

7.15 Aquaculture products if retail packed, should be packed in clean new single-use plastic bags. Packing materials such as plastic bag should be kept away from 893 rodents, birds, farm animals and physical and chemical hazards.

7.16 Packers should wash their hands before packing, and must not smoke, drink or eat the same when packing the produce as they may introduce microbes from their mouths.

7.17 Packing containers/crates containing harvested aquaculture products must be raised on pallet and not directly on the floor to avoid contamination and kept in separate area away from contaminating agents such as pesticides or fertilizers.

7.18 Packing room must be separated from toilet facilities and must be kept clean, tidy well ventilated and free of foul smells at all times.

7.19 Harvested aquaculture products should be retail-packed (or bulk packed) and sealed on the farm. Each pack must be clearly labeled with the farms name according to the labeling regulation.

Storage

7.20 Storage facility must be sanitized and free from decaying farm waste and foul smell.

7.21 Aquaculture products should be stored in the cold room immediately after packing. Refrigeration equipment should be in good working condition with regular temperature check and records.

7.22 When using an air-based cooling system, the air system must be properly maintained so that the air is clean and free of pathogens.

7.23 Water used for cooling system and to make cooling ice should be free of pathogenic contamination. Use of chlorinated water is recommended and samples should be taken at least on an hourly basis to monitor chlorine contamination.

7.24 Cooling equipment must be cleaned and inspected frequently. Maintenance of equipment and use of appropriate sanitary procedures is critical to assure the safety of the produce.

Transport and Distribution

7.25 Fish transport trucks shall be disinfected in between the handling of different fish lots.

7.26 Trucks used for hauling potential sources of contaminants (e.g. trucks for sand and gravel, etc.) should not be used.

8 Monitoring and record keeping BPGs

Monitoring and evaluation

8.1 Monitor effluent quality from hatcheries and nursery ponds
8.2 Monitor water quality around cages and pens
8.3 Monitor sediments close to cages and pens
8.4 Evaluate if impact on the environment is getting worse

Record keeping

Farm data and record keeping can help provide better control over the management and efficiency for the farm. Collection of basic production data is an important part of farm management as it allows analysis of the farm performance and notice trends. Collection of environmental data allows the farmer to check if water quality or environmental impacts are getting worse.

Documentation

Updated records must be kept for up to two (2) years. New farm applying for certification must have three (3) months of farm records.

8.5 As part of record-keeping, all broodstock should be individually tagged or marked. Records should include size, movements, age, etc.
8.6 Keep records on mortalities and health status
8.7 Adopt traceability & keep records following available international & national formats
8.8 Record all farming inputs data for each production cycle
8.9 Records should be kept for at least two years
8.10 Keep records on feed use and water quality.
8.11 Record all essential data - purchasing
- Purchasing records for feeds, fertilizers and pesticides/drugs
- Purchasing records for stock fry and fingerlings/seeds
- Purchasing records for farm equipment/machineries

8.12 Record all essential data - usage
- Usage records for feeds/ fertilizers/pesticides control
- Feed type size and quantity given to fish
- Medication and chemicals used

8.13 Record all essential data - operation
- Records for treatments
- Records for aquaculture production
- Fish escape incidents
- Training records for employees/staff

8.14 Record all essential data - outputs
- Sale records for farm produce

8.15 Record all essential data - environmental
- Water quality
- Farm effluents
- Solid and liquid wastes generated every month

Traceability

The following data shall be recorded for each aquaculture project/farm and each production cycle:

8.16 project/farm identification code/number
8.17 project/farm area
8.18 stocking date
8.19 quantity of fry or juveniles stocked
8.20 source of fry or juveniles (hatchery)
8.21 antibiotic and drug use
8.22 herbicide, algicide and other pesticide use
8.23 manufacturer and lot number for each feed used
8.24 harvest date
8.25 harvest quantity
8.26 sulphite use and protocol
8.27 processing plant or purchaser.

Reporting

8.28 Report notifiable diseases and newly emerging diseases in aquaculture facilities and in the wild
8.29 Report epizootics, natural or man-made disasters (red tides, oil spills) and abatement of the problem

9 Social BPGs (staff training, health and safety)

Aquaculture projects/farms shall provide legal wages, a safe working environment and adequate living conditions for the workers.

Social responsibility

9.1 Encourage cooperation and co-management among farmers and local communities
9.2 Harmonize farming activities with other ecosystem resources users
9.3 Proper disposal of farm wastes (for examples; chemicals, death fish, etc)
9.4 Encourage equality between genders for salary and remuneration
9.5 Promote staff insurance scheme
9.6 Promote safety measures for all workers at the farms

Staff training, health and safety

9.7 Workers should be given adequate initial training, as well as regular refresher training, on safety in all areas of farm operation. They should also be trained in the first aid of electrical shock, profuse bleeding, drowning and other possible medical emergencies.
9.8 The aquaculture project's/farm's living quarters for workers should be well ventilated and have adequate shower/bath and toilet facilities.
9.9 Food services should provide wholesome meals for workers, with food storage and preparation done in a responsible manner.
9.10 Trash and garbage should not accumulate in living, food preparation or dinning areas.
9.11 Aquaculture operations shall be based on technology and equipment that ensure the safety of the employees. This includes establishing routine for handling materials and

chemicals to avoid health hazards to workers.

9.12 Provide life saving equipment on boats, cages and pens

10. Environmental management

Farms in harmony with the environment will remain within the carrying capacity of the area and will not overpower the environment which leads to fish kills.

10.1 Make a baseline study of the environment around the site before operations begin
10.2 Monitor the environment regularly
10.3 Maintain all records and make available for authorities and regulators
10.4 Use predictive models or computer programs to highlight potential risks
10.5 Use alternate sites where possible (fallowing)
10.6 Use single production runs
10.7 Use biological management rather than chemical solutions when possible
10.8 Certify/register compliance of the site with any government regulations
10.9 Encourage integrated culture systems including fish, molluscs and seaweeds in a farm or area

Bio-Wastes

10.10 Collect mortalities daily regularly
10.11 Do not throw dead fish into the sea. Dispose of mortalities correctly by incineration, drying or in silage Burial of dead fish on land when mortalities occur should be strictly practiced
10.12 Collect, treat, and correctly dispose of kill water and blood water
10.13 Collect and correctly dispose of bio-waste (offals, etc.)
10.14 Recycle wastes whenever possible (fertilizer, silage)

Other farm wastes

10.15 Screen areas for stored and discarded farm equipment and materials
10.16 Control pests
10.17 Buy and use recyclable packaging materials where possible
10.18 Make rubbish bins available (eg empty feed bags)
10.19 Separate biodegradable from non biodegradable wastes
10.20 Collect rubbish daily and dispose daily
10.21 Recycle or dispose of rubbish correctly
10.22 Organize regular litter collection in the farm area